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DESCRIPTION

OF THE

HYDRARCHOS HARLANI:

(KOCH,)

(THE NAME SILLIMANII, IS CHANGED TO HARLANI, BY THE PARTICULAR
DESIRE OF PROFESSOR SILLIMAN.)

A GIGANTIC

FOSSIL REPTILE:

LATELY DISCOVERED BY THE AUTHOR, IN THE STATE OF ALABAMA,

MARCH, 1845.

TOGETHER WITH SOME GEOLOGICAL OBSERVATIONS MADE ON DIFFERENT FORMATIONS OF THE ROCKS, DURING A GEOLOGICAL TOUR
THROUGH THE EASTERN, WESTERN, AND SOUTHERN
PARTS OF THE UNITED STATES, IN THE
YEARS 1844—1845.

BY DOCTOR ALBERT C. KOCH.
Corresponding Member of the Societies of Halle, and of Dresden, &c.

SECOND EDITION.

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1845.

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HYDRARCHOS HARLANI.

Before entering upon the description of a new fossil animal discovered by me in South Alabama, and termed the Hydrarchos Harlani, it will be perhaps not without some interest to the reader to know that I left Europe the second time in May, 1844, with the intention of visiting and exploring those parts of the United States which I thought would afford the greatest interest to science, in regard to their geological location, and which have, so far, been very slightly and unsatisfactorily known, both to the world in general, and to geologists.

I was in this undertaking, entirely dependant upon my own limited means, therefore under the necessity of selecting only the most interesting parts of the Union. Commencing at a certain point on the Island of Martha's Vineyard, known by the name of "Gay Head," from whence I proceeded to the falls of the Ohio; investigating particularly, that part of the country which is situated between New-Albany and Jeffersonville, in the State of Indiana.

Here I met with great success, and made many new discoveries; in particular, of a great variety of Coral species, which thus far had been unknown to Geologists. The splendor and variety of species of Corals are here so great, that notwithstanding the falls of the Ohio have been examined, and visited by many celebrated geologists, there was still room left for more discoveries; but had it not been for a most wonderful protection of a kind Providence, my career would here have been closed for ever—or, at least, I should have been decripid, and deprived of my eyes under the following circumstances. I had been spending the greater part of a beautiful day, accom-

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panied by a geological friend, in exploring a certain Island, situated in the centre of the falls of the Ohio River, which afforded a rare opportunity for geological discoveries; as the water in the river was lower at this time. than it had been at any period for six years previous. The whole day I had been extremely successful in my researches, so much so, that my friend Doctor C. in a jovial way, made the proposition to purchase my eyes,—to which he attributed my success—for the sum of two thousand dollars; which proposition I declined, in the same manner. Engaged in conversation of this kind, we approached the main shore of Indiana in a small boat: when we were not more than thirty yards from it, something surrounded me similar to a heavy shower of hail, and the water in the immediate vicinity, had the appearance of being beaten by hail on its agitated surface; the whole of this was accompanied by the report of a heavy loaded gun—from which in fact, it had originated—as we observed after the first moments of excitement were over, viz:—two boys had concealed themselves behind the rocky shore of the falls, for the purpose of watching the movements of a snipe, which had been walking on the bank of the river in pursuit of food; and in firing their gun, came in a line with me; eight of the duck-shot, with which it had been heavily loaded,were found lodged in the plank of the boat immediately below where I sat; in fact, I was surrounded with the whistling shot. From the falls of the Ohio, I went to St. Louis. in Missouri, and took the first steamer for Bloomington, in Iowa, where I made a magnificent collection of fossil plants, which I found here in the new red sand stone; I also discovered not only the leaves and branches of a variety of extinct tropical plants, but the whole trunks of some palm trees, exhibiting most beautifully, the marking of the leaves which they had shed during their progressive growth; I likewise found here, fossil flowers and fruits in the same high state of preservation; and during my return from Iowa to Missouri, I had an opportunity of examining the lower rapids of the Mississippi, the geological formation of which belongs to the Silurian formation, and to my great surprise, I discovered here, bones belonging to an unknown, or undescribed animal, which I suppose will be classed with the *Batrachia*, probably the Frog, or Salamander—but of gigantic dimensions. This discovery is especially remarkable, as thus far, no traces of any air-breathing creatures with lungs, have been found down to this (geologically speaking) very remote period.

From the rapids of the Mississippi, I returned to Missouri, where in particular, I explored Jefferson County, and especially the rocky shores of the Mississippi; which heretofore have been represented as being formed of mountain limestone: yet I found them of a much older date than the beforementioned limestone, which is of the Devonian system, and containing a splendid variety of fossils.

I spared no pains or expense to ascertain the facts concerning some fossil footsteps, which have on several occasions, been noticed in this part of Missouri, and which excited much attention in the scientific world, both of Europe and America. The last statement made within my knowledge, regarding these footsteps, was given in Professor Silliman's Journal of Science, and as the article there inserted, was an answer given by Doctor Owen, State Geologist of Indiana, to Professor Mandell, of Brighton, in England; viz:—the latter had requested Doctor Owen's opinion on this subject; his reply was, "that the steps were evidently those of two naked feet in a standing posture, but to admit that they were actually imprinted by a person when the material was in a soft state, so as to admit an impression, I cannot do, for the following reasons. First,—The steps are, as I observed, in a standing posture, and no trace could be found leading from, or to them. I have endeavored to ascertain, whether they were pointing from, or to, the river; but did not succeed in obtaining any information on this point. Therefore, if they were the tracks of a bird, it might have flown there and off again, without any further tracks, but this could not be done by man. As the tracks were immediately upon the river, we might argue, that a person stepped into a boat without leaving any further tracks, but as stated, this could not be ascertained." Second—"Those tracks," he says, "are thus far unique;" and, Third, "It is so entirely against our present received geological opinion concerning the mountain limestone, that we may rather suppose those tracks were carved by some ancient artists; but who were those artists, that left the work of their ingenuity for us, as a puzzle, is very difficult to decide; it is yet more difficult to imagine those steps to be impressed by the feet of a person living at the period of this formation. That those foot steps were artificially made, I have ascertained beyond any possible doubt; I have seen a variety of them for miles south-west of the lead mines known by the name of Mammoth Leet, which are situated on the borders of Washington and Jefferson Counties, Missouri; they are then also accompanied by various characters, engraved within the rocks, some imitating the Sun, others resembling a Thunderbolt, &c. One of the footsteps is single, and I believe that the artist had not time, or opportunity, to carve the other, and therefore, this question may be set at rest.

But a new wonder now arises, in which art has no share. Some fossil footsteps, I discovered seven miles from Herculanium, on the shores of the Mississippi; two of which, resemble, in size those of a large full grown person, and one, those of a boy about fourteen years of age, together with these are also two footsteps, left by a bird of the Crane, or Heron species: and I am happy to add, that I have succeeded in preserving to science, the stone containing this most wonderful relic of olden time, and that it is now in my collection.

These foot impressions, I consider to have been made by some unknown reptile, perhaps a frog, or salamander. A few miles from this place, and in the same formation, I discovered other foot steps which have a great analogy to those left by a mammalian animal; some of these are the size of the track of a large wolf, while others are only the size of those of a common cat.

In December, 1844, I left St. Louis in the steamer Palestine, with the design of going by New Orleans to South Alabama, but at this time the ice began to run so rapid in the Mississippi, that the boat soon became almost unmanageable, and when we had arrived within a few miles of the place known by the name of "the Grand Tower," we were so jammed in by the ice, as to be in great danger of being wrecked, and of losing our lives. The ice presented a most terrific scene, the main channel being completely blocked up, the accumulating mass threatening immediate destruction to all on board; human aid was considered insufficient to render any assistance, and all our hopes were placed in a kind providence. After spending a dreary, dreadful night, we made our escape in the morning, by placing planks from one floating cake of ice to another, and by this means succeeded in reaching the opposite shore in safety. I will not stop here to enumerate the minor difficulties, with which we had to contend, but only mention that I was compelled to travel through the State of Illinois, by land, to the Ohio river, for the purpose of re-shipment. After encountering various difficulties, I arrived at a place known by the name of "Golconda," where, during a geological research, I discovered a large deposit of old red sandstone formation, or Devonian system, in which I found a great variety of non-described fossil fish of most wonderful forms, the spiral columns of many of them bearing a striking resemblance to a screw, so that they are called by the inhabitants of the country, petrified screws. I also found here a variety of fossil shells and corals of the species which are characteristic of the old red sand stone formation, or Devonian system.

In January, 1845, I started for Alabama, where I began my researches at Claiborne, Monroe County, on the Alabama river. Here I discovered ten different beds or deposits, resting in a waiving, or rolling position one over the other, and forming in this manner, a bluff of two hundred feet in perpendicular height, above the level of the Alabama river, known by the name of Claiborne bluff. Each separate bed containing objects of the highest interest to the geologist, as well as the close observer, and each answering as a record of those ancient revolutions of our globe, during which millions of lives were almost momentarily destroyed to make room for new ones to appear upon the stage of action, to flourish for a longer or shorter period, until, in some sudden and unexpected moment, they met with the fate of their predecessors, and their remains formed a new bed of fossils, which at last were unanimously upheaved out of a deep sea, whose waves had been rolling over them for unknown ages.

It would lead me here too far, to give a description of all the various strata; for this reason, I will at once, in my description, leave Claiborne, and cross the Alabama river into Clark and Washington counties, which, (to a geologist,) contain some of the most interesting regions of the known world,—and afford fully, the same satisfaction as the Waelden formation of England, from which the celebrated Mandell brought to light so many monstrous reptiles which, ages ago, were the terror of the existing animal creation. Great is the interest, with which a geological eye looks at those regions of England,—and wonderful are the creatures with which we are thus made acquainted. But a new scene has opened itself in America, which until now, remained in almost entire obscurity. A new comet as it were, has burst upon us, shedding its refulgent light upon the geologists of the present day.

Claiborne, which was visited some years ago by Mr. Conrad, was considered by him, to use his own expression in a geological point of view, as Classic ground. But the section of country commencing in the vicinity of Clarksville, in Clark county, extending into Washington county, and from thence into the State of Mississippi, as far as I have been capable of exploring it, exhibits not only the same variety of oceanic estuary and land shells, which we find at Claiborne, but also, a variety of shells hitherto entirely unknown, and if we go higher up in the order of creation, we find Claiborne almost destitute of such; whereas, soon after we cross the Alabama river from Claiborne, the scene changes, and we begin to discover the remains of vertebral creatures, in a greater number and variety, as we approach Clarksville. A large portion of the surface of this part of Alabama is termed Prairie, yet it differs materially from those large and fertile Prairies of Missouri and Illinois. That which in South Alabama is termed a Prairie, is generally a rocky, hilly, and broken spot of land, which has more or less fertile portions of a black, brown, or white soil, which belong to the same geological epoch, to which a certain yellow limestone is classed, which it partly overlays, and which in larger or smaller fragments, is mingled with it, and sometimes contains broken portions of iron ore and volcanic substances. Geologically speaking, this layer forms the upper portion of a transition bed between the upper, secondary, and the lower tertiary beds which I lately described in my Geological Report of South Alabama. The most characteristic fossil of it, is *clypeaster geometricus*, which occurs here in a high state of preservation; this strata is generally overlaying, or resting on one containing a great number and variety of Marine fossils, once the inhabitants of a deep ocean, which after their death formed for a long period their watery grave, until they, during the still progressive creation, were upheaved upon the dry land, and in the place of those extinct creatures, appeared live ones of quite different forms, whose numerous remains we find now deposited in the above mentioned Prairies of Alabama. They consist of a variety of shells, corals, echini, &c., as also, a large number and variety of shark's teeth and vertebræ, mingling with the remains of some saurier. But the most interesting and conspicuous, are the remains of the Hydrarchos, the most gigantic of Reptiles ever known, and which we can well imagine, reigned as a most tyrannical, cruel, and unconquerable monarch over an extensive estuary, whose full extent is at present unknown. At the time when Clark and Washington counties were first settled, single vertebræ of the fore-mentioned monster were discovered in various of the rocky Prairies, but as the new settlers had no idea of their scientific value, they were destroyed by them in different ways; they were even used for domestic purposes; for instance, I have seen several of them laying in fireplaces to answer in the place of andirons to keep the wood from the ashes, thus giving a sufficient draft of air. I was informed that they stood exposure to the fire so well that some of them had been used during three successive years, for the above purpose, and they were only destroyed by persons carelessly throwing large logs of wood on them with great force.

A Planter of Mississippi who was not acquainted with the fire proof quality of these vertebræ, endeavored to burn them into lime, but to his great surprise and disappointment, they came out of the lime kiln in the same state in which he put them in. Unfortunately, he had broken them into pieces before he had committed them to the fire, therefore they became a total loss to science. One of them however, met with a little better fate, being used for a door step at a Planter's house near Clarksville; where it had for years been trampled upon, but still bid defiance to the ravages of time, and thus gained their admiration; another was used for a purpose that few persons would have thought it fit for, viz: a pillow; notwithstanding, I had been accustomed to see these splendid relics of the antideluvian world burned and trampled upon, which sight not unfrequently awakened in my mind feelings of melancholy regret.— Yet I was somewhat amused while in company with a Planter of Clarke County, I entered the log cabin of one of his slaves, where I could not refrain from a hearty laugh at observing one of Afric's blackest sons stretched out comfortably on his humble cot, his curly head resting securely upon the half of a vertebræ of one of these most horrid monsters of old.

These vertebræ were also used for architectural purposes; for instance, one of them I dug up from under the ruins of an old chimney, where it had answered the purpose for many years, of a corner stone, until at last the chimney yielded to time, and its falling ruins buried the relic, which like the bird Phœnix re-appeared unhurt, and as fresh as ever when taken out of the mouldering ruins, and now forms a part of my valuable collection. Another of them was, by the ingenuity of man, buried in the earth for the purpose of running the hinges of a garden gate on its articulating surface. I am convinced that if some enterprising geologist, or comparative anatomist provided with means, had explored those regions of Alabama, eight or ten years previous, he would have been capable of securing many treasures of this kind which are now destroyed, and irrevoceably lost to science forever.

With melancholy feelings, I made this observation, and had almost given up in despair, the hope of securing at least one nearly perfect skeleton of those wonderful beings to science, as I was most agreeably disappointed, by the discovery of the monstrous Hydrarchos in a small prairie, situated near the Sintabougue, or, (translated from the Indian tongue,) Snake River, which prairie had been only one year in cultivation, during which time, some of the vertibræ were exposed; this led me to the discovery of the rest of the enormous skeleton, which will now add a new proof to confirm the observations made by recent researches, that this vast country bears a corresponding resemblance, in point of massive animal remains, to the sublime and enlarged magnificence, which characterize the natural features of its surface and soil. This relic is without exception the largest of all fossil skeletons, found either in the old or new world. Its length being upwards of one hundred and fourteen feet, without estimating any space for the cartilage between the bones, and must, when alive, have measured over one hundred and forty feet, and its circumference probably exceeded thirty feet, reminding us most strikingly, of the various statements made by persons, in regard to having seen large serpents in different parts of the ocean, which were known by the name of Sea Serpents.

These statements have in general gained but little credence, as they spoke of the appearance of creatures so different in form and size from any with which we have heretofore been acquainted, either by natural history, comparative anatomy or by geology; notwithstanding corresponding statements have been made by men of the best moral character. What shall we therefore think now, if we behold the almost perfect remains of a huge Sea Serpent, or reptile, answering not only in its colossal size, but also in other respects remarkably the description given of a monster, which many respectable citizens have stated under oath that they have seen swimming alive on the ocean.

The Hydrarchos has little in common with the Saurier, or Lizard, with which a large number of monsters of old are classed, and with whose remains we have already become acquainted, through the progress of geological discoveries; as the teeth of all creatures belonging to the Saurier, or Lizard family, have only one fang, whereas the molar teeth of the Hydrarchos have two distinct fangs; those of the anterior teeth are closely united, but become more and more forked, as we approach the posterior ones; these molar teeth have a certain analogy to those of a Marsupial animal, still they are like those of all the serpent tribe; formed less for the purpose of mastication, being slight, and small in size, it would seem that the animal did not masticate its food, but gorged it entire: which is more expressly proven by the fact, that this creature was provided with palate bones, which have some similarity to molar teeth, but could only be used for the purpose of crushing its food. Its greatly elongated snout was armed with fifty or more spear shaped molars whose fangs were deeply inserted in distinct sockets. The pivocation is in the extreme anterior ones, only marked by a groove; the spear shaped crown of these teeth is divided into more or less minor spear shaped points, which increase or diminish in number, according to the situation the tooth occupies in the ramus; the central one of them is the longest, and those nearest the gum are the smallest. These crowns are covered by a thick coating of enamel, which had a rough surface, and are marked with small scale-like elevations which are narrow, lancet shaped, and elongated, with their points upward, arranged in a manner like the tiling upon a roof. All the teeth are so set in the ramus and the maxilla, that their extremities have an inclination backwards towards the palate, like those of the shark, so that the victim caught, could easily enter the mouth, but could not possibly escape. The canine teeth correspond in regard to the beforementioned position with the molaris, as they also curve backward, as well with the superior as with their inferior extremities both of which terminate in a blunt point, the inferior being the sharpest. These teeth are from six to eight inches in length, full five sixth of their length being concealed in the ramus and maxilla; and their superior or exposed points, are covered with a thick coating of enamel, which exhibits the same marking which was observed in the already described molaris. The bodies of these teeth are compressed, and have their greatest circumference in the centre, standing from one to two inches isolated from the incisors, and from one, to one and a half inches from the palate bones.

These palate bones are contained in an alveola, of an elongated oval form, and are not unlike the posterior palate bones which we find in the drum fish; they are from two and a half, to three inches in length; and from one and three-fourth, to two inches thick; forming a compressed oval, covered with a thick covering of crusta petrosa; especially characteristic are these cone-like teeth, respecting a spiral shaped portion of them, which, while partly concealed and partly exposed to view, measure from one and one fourth, to one and a half inches in length, and half an inch in diameter, at their base; these palate bones indicate some relation of the *Hydrarchos* with the pisces or fish; whereas, some characteristics likewise indicate a relationship to the Cetacea, while others indicate a relationship with the Plesiosaurus. Its tendal system proves it to be carnivorous, and in fact omnivorous: and I am greatly inclined to believe that not unfrequently it preyed upon, and devoured its own kind; so that the stronger destroyed the young and more feeble. I have been led to this conclusion, from the fact, that during all my researches in Alabama, where I have had an opportunity to see a large number of broken and defaced vertibæ of this animal, I have only discovered one that belonged to the young of this species; which animal, when alive, I should judge might have measured from forty to forty five feet in length; and on account of the ferocious nature of the Hydrarchos, we should be less astonished, that we find mingled with its remains, those of smaller vertebræl creatures belonging to a variety of fish, and occasionally some Saurier, when we take into consideration what a great number of such minor creatures must have lost their lives daily, in order to gratify the craving appetite of this giant monster, whose terrific eyes were seeking constantly for some prey which it might seize with its horrible jaws.

The structure of the nasal cavity, shows the animal to have been an air-breathing reptile, since the posterior outlets are at the back part of the mouth, it must therefore, have respired freely, like the Saurier.

The estuary deposit in which its remains occur, prove it to have been an inhabitant, or at least, a frequent visitor of large Rivers and Bayous, on whose surface it sported with its head and neck elevated above the water seeking for victims to devour; either of those that were asleep, those that were walking unsuspectingly on the adjoining shore, or those that came to the surface to enjoy the pleasing warmth of the sun, as the Alligators of the present day, which are frequently observed sleeping on logs, in, or near the water of Bayous or morasses of the Southern parts of the United States; or as the Plesiosaurus did in by-gone ages, which was supposed to have swam upon, or near the surface of shallow waters, arching back, like the Swan, its long neck, (which was of an enormous length, resembling the body of a Serpent,) and occasionally darting down at the fish which swam within its reach.

The supposition that the Hydrarchos frequently skimmed the surface of the water, with its neck and head elevated, is not only taken from the fact, that it was compelled to rise for the purpose of breathing, but more so from the great strength and size of its cervical or neck vertebra, and the comparatively small size of its head, which could, with the greatest ease, be maintained in an elevated position, when in the act of carrying in its jaws a Shark or a Saurier, while struggling for life, to free itself from the dreadful grasp with which it had been elevated from its native element, to serve as a morsel to this blood thirsty monarch of the waters. The eyes of this monstrous Reptile, were situated in such a manner, as to assist it in seeking and catching its prey with more ease, for they were not only of a large size, but prominently placed on the forehead, and measured from six to eight inches in diameter. The propelling motion of the animal, was like that of the Serpent tribe; depending upon the action of its powerful vertebræ, and the strong muscles and ligaments, acting in harmony with them. The strong and lengthy tail was used as a rudder to direct its course; as well as for the purpose of propelling. The transverse processes, which are very large in the whole of the spinal column, are more especially so in the coceygel, or the tail vertebræ; the canal for the spinal marrow, is very much compressed, and flat, and the spinous processes have a great inclination backwards. The dorsal and lumbar vertebræ are greatly elongated, measuring each, from fourteen to eighteen inches in length, and have a circumference from twenty-four to thirty inches. Their construction differs from those of any animal with which I am acquainted, as each body of this vertebræ is composed of five sections. In the centre we observe the main body, to which all the processes are attached, and which meausure from five to seven inches in length; to both extremities of this is an apives section anglelozed, measuring from three to four inches in length, and to the extremities of these again, we find an apives with the slightly depressed artientating surface on its extremity. The whole is angelosed and ossified together in adult, but will separate in younger animals,—which fact I have had an opportunity of observing personally. The cervical or neck, and the coccygel or tail vertebræ, have powerful processes, but their bodies have not the additional divisions which have been described above, as found in the dorsal and lumbar vertebræ. The ribs are of a very peculiar shape and form; so much so, that I know of no animal to which I might compare them; the greater number are small, and remarkably slender on their superior extremities, until we arrive within two thirds of the length toward the inferior extremities, where they begin to increase in thickness most rapidly, so that near the inferior extremities where they are flattened, they have three or four times the circumference that they have on the superior, and they have very much the curve of a sickle. From the whole of their construction, we may justly form the conclusion that the animal was not only possessed of a fleshy back of great power, but also, of remarkable strength in its belly, by which means it was enabled to perform very rapid movements, notwithstanding its two paddles being quite small in comparison with the rest of the skeleton, yet they are in proportion with the short and thick Ulva and Humerus, or fore-arm, which, together with the paddles, have been concealed under the flesh, during the life of the animal, in such a manner as to be only perceptible through muscles and cartileges, similar to the fins of the eel. The Humerus and Ulva are not unlike those of the Ichthyasaurus.

Extract from the New-York Dissector.

THE HYDRARCHOS, OR GREAT FOSSIL SEA-SERPENT.

ASTOUNDING as the progress of geological discovery has been, for the prodigies of the animal kingdom which it has developed, and the enlarged views of the pre-historical epochs of our globe which it has demanded, it has hitherto produced nothing so highly calculated to impress both the scientific and the popular mind with the wealth of its resources and the magnificence of its instruction, as the stupendous fossil skeleton represented in the annexed engraving. In presenting to us the petrified remains of a marine Reptile whose original length was evidently, at least, 130 feet, with a bulk in due proportion, we have tangibly and palpably realized not only ophicular descriptions of the ancient poets and historians, heretofore deemed fabulous, but the attestations of modern mariners and voyagers, which assert the existence of a similar terror of the ocean, even in our own times, and off our own shores. The serpent of the Deucalian deluge, slain by Apollo Pythius, is beheld, with scarcely the aid of the dullest fancy, in the Apollo Saloon in Broadway. And the gorgeous portrait of the Leviathan, (Heb. *levi-ten,* or " doubled dragon") in the matchless poetry of Job, has found its first conclusive prototype in this Hydrachon—so strikingly, so, indeed, to every scholar who will undertake a critical examination of the original language, as to completely supercede every animal heretofore proposed by commentators as the subject of the description, together with the Missourium, recently proposed for this purpose by Dr. Koch, the discoverer of this more appropriate examplar. He who, " when he raised himself up caused the mighty to be afraid ;" who, "laughed at the shaking of the spear, and spread sharp-pointed things upon the mire ;" who made "the deep to boil like a pot of ointment ;" who made " a path to shine after him, so that one would suppose the deep to be hoary," *is here,* in bony majesty, filling us with wonder and awe, at the proofs we behold of his speed, destructiveness, and incomparable power. Indeed, we are confident it will ultimately be a point of unanimous opinion that the Leviathan is the apt and distinctive title which this re-discovered creature should permanently receive.

It was discovered by Dr. Koch, a zealous German Geologist, in the early part of the present year, (March, 1845,) in a small prairie in Washington Co., Alabama, near the Sintabouge River. The field in which it was found, had been but a short time in cultivation, and the vertebræ first disinterred were turned up by the plough. Dr. Koch was induced to explore this district for the purpose of procuring, if possible, a perfect skeleton of the gigantic saurian, denominated from the immense dimensions of its vertebræ the Basiliosaurus, or the King of the Lizards, which had been found in Clarke Co., Alabama, some years previous, by the late Dr. Richard Harlan, of Philadelphia.

Dr. Koch thinks that the incisors of the Hydrarchos have some analogy to those of a marsupial animal—a singular thing enough, if we overlook the fact that all serpents are so far pouched animals as to swallow, or present an internal receptacle of refuge for their living young. It is evident, moreover, that the Hydrarchos did not masticate its food, but gorged it entire, although, says Dr. Koch, it was provided with palate bones which might have been used simply to crush its food.

Not only its necessity of breathing, but the prodigious size and muscularity of its cervical vertebræ, indicate its habit of rearing itself above the water; and when we also examine the peculiar structure and marvellous strength of its massive lumbar vertebræ, which may be regarded as the axis of its muscular power, we feel authorized to conclude that it could erect nearly two thirds of its entire length from this basis, in a majestic curve above the surface of the tide—often, doubtless, in tranquil seasons, a glowing mirror of its gorgeous form and stately movements. Its eyes, too, which were from six to eight inches in diameter, were so prominently situated on the forehead as to secure it a vast circle of vision, and render it a vivid object of terror; and when Job says of his leviathan that "his eyes are like the eyelids of the morning," the force and beauty of the poetic hyperbole are as appropriate to the eyes of the Hydrarchos as to those of any animal, not purely imaginary, of which we can form an idea.

The peculiar form correctly assigned to the ribs of this ponderous creature by Dr. Koch, as being so much thicker and stronger at the part of the curve where they turn to bend under the belly, is evidently an admirable provision of nature for sustaining the immense superincumbent weight of its mass, when resting upon a shore, or depositing its bulk for repose, upon the bottom of any other shallow waters; and as a respiring reptile, this sea-serpent must have often enjoyed the ease of such a position, fearless of every foe. That none of the saurians, nor any other animals, should be found to exhibit this very striking singularity of costal structure, is simply because they were otherwise furnished and did not need it; while to this creature, devoid of legs, and all pedal points of support, the provision was indispensable, and he accordingly possessed it. After all, the ribs seem exceedingly slight for so bulky a mass, and there can be no doubt that they were strengthened with those well-knit bands of intercostal cartilage and muscle, which supply the place of osseous ribs in the large conger eel, and other varieties of the serpent race.

Concerning the natural habits and capacities of this wonderful animal, comparative anatomy will spread a rich field of beautiful analogy and scientific induction.

Whether he were amphibious, to the extent of our present water snakes, may well be doubted from the evidence afforded by his side fins of a more decidedly piscine character. The last joint of his tail, too, indicates a final bifurcated fin; and the finding of this termination of the vertebræ, cannot but be regarded as a most felicitous circumstance, for while it tends to determine the animal's distinctive nature, it also proves an admirably tapering symmetry of form, peculiar to the serpent species.

The following is a summary of Dr. Koch's unpublished description of the upper and nether stratification of the spot and neighborhood in which these stupendous fossil remains were discovered; and we have great pleasure in presenting to our readers a matter of so much scientific curiosity:

A. A stratum of diluvial gravel with shells.

B. A stratum of a blood-red color, from a deposit of clay, highly impregnated with iron, and exhibiting grey veins.

C. A stratum of peculiar lime stone, forming in some places remarkable terraces, in divisions or steps. from five to seven feet high, and from thirty to forty horizontal breadth, exhibiting great regularity. These occur in locations, in the vicinity, where traces of a most violent and rapid current appear, and apparently of diluvial action. This lime-stone is termed "chimney-rock," by the inhabitants of the neighborhood, and is so soft as to be sawed into blocks for building, with a common cross-cut saw.

D. A stratum of volcanic origin, forming an extensive bed of volcanic matter, inclosing and cementing various kinds of fossil wood, some partly in a crystaline state and others reduced to charcoal. These specimens of fossil wood, which increase as we leave Clarksville and approach the Mississippi, prove the existence of dry land vegetation at this epoch; and from the admixture here found of fresh water shells with a large number of beautiful marine fossils, the spot seems to have been connected, at the time it was on the surface, with some shallow sea or bay. In Clark and Washington counties this stratum is frequently laid open. forming, indeed, a considerable portion of the present surface, and often appearing like a dark brown vegetable mould, mixed with corroded volcanic substances and calcareous matter. Its volcanic origin is clearly traceable whereever it is laid bare; fragments of lava are thrown for miles around the vicinity of Clarksville, and we frequently find extensive beds, formed of a mixture of sand, iron ore and lava, once in a melted state, but now broken in layer, or smaller sections. Sometimes pieces of pumice stone are found here with bituminous coal, and an extensive bed of the latter is said to exist in the Tallehalla Hills in Clark Co.

E. A stratum of yellowish lime rock, containing fossil remains of myriads of animals and shells. In this stratum, at a spot near a chasm, where it had been lifted to the surface, and where the superincumbent strata were thrown to the right and left, by volcanic action, was found the skeleton of the Hydrarchos, or as we would have it called, the *Leviathan*. The vertebræ, with the exception of one or two joints that had been turned up by the plough, were found and dug out in the natural order in which they lay, and in which they are again put together in the skeleton as exhibited.

F. A stratum of quartose sand, ten or twelve feet thick, which Dr. Koch conceives to be a continuation of the stratum marked "ivI." (see below.) He says that at Clarksville he found the upper section of this stratum, containing oysters of a large size, while, on the Tombigby side of the dislocated elevation, he found the lower portion of this stratum, containing oysters in quite a young state of growth. He adds that at Coffeeville, the same stratum appears ten or fifteen feet thick, the lower portion as marl, and the upper as laminated lime rock of the same color as at Claiborne.

G. A stratum of rich green sand, containing highly brilliant shells, of a light green color. This stratum is particularly characteristic, having a bed of oysters entirely different from those in the underlying (I.) and forming a bank which appears never to have been disturbed. Indeed the shells of many of these bivalves still remain united.

H. A stratum of quartose sand, fourteen or fifteen feet thick, containing shells of oysters and other oceanic shells. Here, in the neighborhood of Clarksville, occurs a miniature species of the saw-fish, its saw, although of a similar construction to that of the existing species, being but about three inches long, instead of as many feet. Several species of oysters occur here, which must have originated at this epoch, as they are not found either above or below. "I discovered," says Dr. Koch, "that this last bed is identical with the one of green sand (G) mixed with blue clay, and with an over-lying osseous conglomerate, containing principally the remains of sharks; the first being also mixed with yellow lime stone, and the second with mould of the prairie of Alabama: the latter proving by its numerous fossils to be the upper section of the transition series, uniting the highest cretaceous with the lowest eocene region. The yellow limestone and the green sand both contain the remains of the largest reptiles; for the Zuylodon, (by some called the basiliosaurus.) I discovered at Gay Head, Martha's Vineyard, where it occurs only in the green sand; and in Alabama, where it as exclusively occurs in the yellow lime stone. The remains of extinct crabs occurs in both localities, of an identical character; and several species of sharks and saurians, found in the osseous conglomerate of Gay Head, are identical with those of the prairie mould of South Alabama.

I. A stratum of light blue and yellowish limestone, in some places 70 feet thick, as a rich greenish white marl. Where it occurs as a limestone rock, it has strongly the appearance of an uninterrupted bed of the same species of oysters, small and frequently mingled with the casts of oceanic shells, which formed the principal portion of the above mentioned under-lying bed. As we ascend, the oysters increase in in size, that they may be termed the giants of their race, forming almost a solid bed.

J. A stratum of dark greenish sand, in some places 15 feet thick, containing a great variety of shells, all belonging to those species which we find in deep open seas in tropical latitudes. They are generally in broken fragments, with a few in good condition. We also find a few young oysters, of a kind belonging to the chalk formation. Dr. Koch considers the whole of this bed as the upper part of the secondary formation, and consequently of a far older date than has heretofore been assigned to it.

From this clear and interesting account of the strata among which the Hydrarchos was found, and which in Dr. Koch's exhibition room is illustrated by a sketch on canvass of their present dislocated position, relatively to the perpendicular bluff in the neighborhood where they appear in their original and undisturbed level, it appears that there were one stratum of volcanic origin and formation, and three strata of oceanic deposits, piled above the remains of this animal, upon the surface on which he expired. As the volcanic stratum D, occurs next above the one E, in which these remains were found, it is not improbable that the immense sub-marine volcano which then burst forth, was the immediate cause of this creature's destruction. But the strata, C. B. A. above this volcanic one, being oceanic, must have been deposited at three several and distinct periods, or geological epochs, when the ocean arose and overflowed the strata that had previously been formed. Geologists, as yet, have furnished us with no data by which we can determine the length of those periods, nor indeed any chronological key whatever to the stratification of the earth. Thus is geology left without a chronology which alone can harmonize its phenomena, and elevate it to the dignity of a science. That chronology, however, like every other, must be sought for, and, we have long thought can only be found, in an astronomical source, developing and demonstrating the changes in the position of the earth's axis towards the plane of the ecliptic and the sun, under the influence of the spiral motion of the magnetic poles, as calculated and published in our Astro-Magnetic Almanac for 1843. From the calculations there given it appears that it requires 2,304,000 years, or one complete siderial revolution of the earth's axis, for the ocean to deposit two strata; and, consequently, that the period of 3,456,000 has elapsed since the three oceanic strata were deposited over the skeleton of the Hydrarchos. We say nothing of the time during which the volcanic stratum was formed immediately over these remains, because this occurred in the interval between the formation of the yellow limestone stratum in which they were found, and that of the limestone stratum C, next above the volcanic stratum itself. But since the deposit of the third oceanic stratum A, a period has elapsed of 1,008,000 years, during which the ocean has again advanced from the equator towards that latitude, in its progressive formation of a fourth stratum; so that this time must be added to the one before given, to make the total period 4,464,000 years, since the Hydrarchos was destroyed. And immense as this period may seem to those who are unaccustomed to the contemplation of the astronomical causes of stratification, it cannot be abridged without resorting to a succession of miraculous causes to explain the phenomena which undeniably exist. It was sometime in the last intermediate period of 1,008,000 years, that the new subterranean disruption of the strata of that locality occurred which raised these stupendous relics from the place of their protracted oblivion, to become the wonder of the present age.

Extracted from the New-York Evangelist.

The people of this country have at length an opportunity of seeing a genuine inhabitant of the World before the Flood. There is no doubt that this is one of the most stupendous creations of Almighty Power and Wisdom. The mind is filled with wonder at its contemplation. And it is not a little singular, that these colossal remains should have been discovered just at a period when the unbelieving sciolists of our day are making such a noise with their theories about the vestiges of creation. We should be curious to know what rank in his scale of development the Vestige-author, who fathers men upon monkies, would assign to this floating colosseum of existence, what niche in nature's progress he would have him fill up.

It is a most astounding creature! All the freaks of the nightmare never yet frightened the brain with such a dream of bones and ligaments. He must have seen strange things in his day. What a huge involving bulk he carried through the waters! He must have looked like Milton's snaky sorceress of Sin at Hell's door, or like Satan himself,

> With head uplift above the wave, and eyes
> That sparkling blazed; his other parts besides
> Prone on the flood, extended long and large,
> Lay floating many a rood: in bulk as huge
> As whom the fables name, of monstrous size,
> Titanian or earth-born, that warred on Jove,
> Briareus or Typhon, whom the den
> By ancient Tarsus held; or that sea-beast
> Leviathan, which God of all his works
> Created hugest that swim the ocean stream:
> Him haply slumbering on the Norway foam
> The pilot of some small night-foundered skiff,
> Deeming some island, oft, as seamen tell,
> With fixed anchor in his scaly rind,
> Moors by his side under the lee, while night
> Invests the sea, and wished morn delays,
> So stretched out huge in length the arch-fiend lay.

This is indeed that sea-beast. He must have been an ambitious creature. There is great grandeur in the manner in which he carries his jaws. And his eyes doubtless fired up in the green sea-depths like great lamps in a cavern, or like the lights by night in front of railroad locomotives. And if we might figure a wonder of earth, which Milton, if he had ever seen it, would have made use of in some way or other, to which this creature may be likened in the sea, it would be an immense train of cars, with steam engine and all, shot into the bowels of the deep, and flying through the water at the rate of sixty miles an hour.

Doubtless he made a great show among the smaller fishes; "he maketh the deep to boil like a pot." How they fled afar off at his gambols, as well they might from a creature who could swallow a shoal at once. And even the *hattaninim*, the great whales, could have stood but little chance with him. He could have beaten them into mummy by the blows of his tail. He could have twisted it round about them, and slung them off, as a shepherd would let fly a stone from his sling. And even Dr. Koch's Missourium, if he ever came down to drink at deep waters, could have been seized by this monster, and dragged into the caves of ocean, to have his bones cracked, as easily as a Jesuit could steal away a child to educate him.

And this creature was born in the Antediluvian World! Who knows but he had seen the Ark? Who knows but Noah had seen *him* from the window? Who knows but he may have visited Ararat? Who knows how many dead and wicked giants of old he had swallowed and fed upon? Perhaps, when we now touch his ribs, we are touching the residuum of some of Cain's descendants, that perished in the deluge. Perhaps the sea-serpent, that has lately appeared off our coasts, may be some relative of this colossal creature, buried so solidly in limestone, some great-grandson, whose filial piety has stirred him up at the unceremonious exhumation of the bones of his ancestor.

Who knows but those human giants of old may have tried their strength upon him, may have given chase to him? Their famous sea-captains saw him sometimes, and sometimes he may have swallowed their anchors, or carried away their jib-booms, and when they returned home to describe the adventure, they were treated as fish-story tellers; the thing was pronounced a hoax! Who knows?

But there is no hoax in this. If it *were* a humbug, Dr. Koch would make his fortune from the stupendous ingenuity, science and skill evinced in its construction. As it is, it takes him some time to overcome the incredulity of the people. But it is only those who have not seen the monster, that can indulge the slightest questioning as to its genuineness and authenticity. And Dr. Koch deserves the thanks of our whole country, and of all men of science in the world, for that persevering sagacity and industry, with which he has brought this prodigious skeleton to light, and produced it in public. He is himself a man of true science, most unassuming and affable, far from all trickery and ostentation, a German, with true German simplicity and thoroughness.

And now we cannot help thinking what a shame it would be to our country, if this astonishing remnant of the Antediluvian creation should be lost to our possession, should be suffered to find its way to the British Museum, as that stupendous skeleton of the Missourium did before it, to remain there by the public spirit and scientific liberality of the British nation. Let the city of New-York purchase it, and make it the nucleus of a great museum of science, or let the city purchase it, and put it in a hall by itself. Or if it must go to Europe, as doubtless it will, let it be first purchased in this country, to be returned here, and let us no more subject ourselves to the reproach of having no other passion for antiquity but the miser's for rusty dollars. This Hydrarchos of Dr. Koch ought to be retained in this country at all costs.

We shall close our remarks on this amazing object of a past creation by printing the 41st chapter of Job; for we never conceived, much less beheld, any shape of possible existence, that, clothed in flesh and blood, might answer so accurataly to that sublime description. Let the visitors of this wonderful skeleton take that chapter of Job with them, and if they do not experience a conviction that here is the monster leviathan there described, or one of his class and species, or at least a monster of whom, if living in the full power and pride of his colossal existence, that description might be written, it must be because they can see nothing but dry bones in anything.

Canst thou draw out leviathan with a hook? or his tongue with a cord which thou lettest down?

Canst thou put a hook into his nose? or bore his jaw through with a thorn?

Will he make many supplications unto thee? will he speak soft words unto thee?

Will he make a covenant with thee? wilt thou take him for a servant for ever?

Wilt thou play with him as with a bird? or wilt thou bind him for thy maidens?

Shall thy companions make a banquet of him? shall they part him among the merchants?

Canst thou fill his skin with barbed irons? or his head with fish spears?

Lay thy hand upon him, remember the battle, do no more.

Behold, the hope of him is in vain: shall not one be cast down even at the sight of him?

None is so fierce that dare stir him up: who then is able to stand before me?

Who hath prevented me, that I should repay him? whatsoever is under the whole heaven is mine.

I will not conceal his parts, nor his power, nor his comely proportion

Who can discover the face of his garment? or who can come to him with his double bridle?

Who can open the doors of his face? his teeth are terrible round about.

His scales are his pride, shut up together as with a close seal.

One is so near to another, that no air can come between them.

They are joined one to another, they stick together, that they cannot be sundered.

By his neesings a light doth shine, and his eyes are like the eyelids of the morning.

Out of his mouth go burning lamps, and sparks of fire leap out.

Out of his nostrils goeth smoke, as out of a seething pot or cauldron.

His breath kindleth coals, and a flame goeth out of his mouth.

In his neck remaineth strength, and sorrow is turned into joy before him.

The flakes of his flesh are joined together: they are firm in themselves; they cannot be moved.

His heart is as firm as a stone; yea, as hard as a piece of the nether millstone.

When he raiseth up himself, the mighty are afraid: by reason of breakings they purify themselves.

The sword of him that layeth at him cannot hold: the spear, the dart, nor the habergeon.

He esteemeth iron as straw, and brass as rotten wood.

The arrow cannot make him flee: sling stones are turned with him into stubble.

Darts are counted as stubble: he laugheth at the shaking of a spear.

Sharp stones are under him: he spreadeth sharp pointed things upon the mire.

He maketh the deep to boil like a pot: he maketh the sea like a pot of ointment.

He maketh a path to shine after him; one would think the deep to be hoary.

Upon earth there is not his like, who is made without fear.

He beholdeth all high things: he is a king over all the children of pride.

Extract from the New-York Morning News.

We here present our readers with a faithful representation of the skeleton of the monstrous Hydrarchos, which is now being exhibited in the Apollo Rooms, Broadway. It has attracted the attention of so many, and puzzled so much both the learned and the illiterate, that we deemed it of sufficient importance to occupy a prominent place in the *Morning News.* One of our incomparable corps of artists was, therefore, dispatched to make a drawing of all that remains of the antediluvian wonder, and the result is the production of the beautiful engraving which is placed at the head of this article.

Professor Silliman, with many other scientific gentlemen, has examined this extraordinary fossil animal, to whose wonderful skeleton he has not hesitated to invite public attention. He has also written a letter in relation to it, of which an extract will put our readers not only in possession of the opinion of so learned a man, but of the circumstances attending its discovery, together with some account of the animal itself. He says:

"Dr. Koch, the proprietor of the skeleton now in this city, made a journey of discovery a few years since into Alabama and other Southern regions, with particular reference to this animal. He had the rare good fortune, as the result of his perseverance, aided by the kind assistance of the inhabitants, to disinter the stupendous skeleton which is now set up for exhibition here.

It has, evidently, been done at great expense and personal toil, and the public, while they owe a debt to Dr. K., will, when paying it, receive a high gratification in contemplating the remains of a race of animals whose length exceeded that of all other creatures hitherto discovered; the spinal column of his skeleton as now arranged measures 114 feet in length. The skeleton having been found entire enclosed in limestone, evidently belonging to one individual, and there is the fullest ground for confidence in its genuineness. The animal was marine and carnivorous, and at his death was imbedded in the ruins of that ancient sea which once occupied the region where Alabama now is; having myself recently passed 400 miles down the Alabama river, and touched at many places, I have had full opportunity to observe, what many geologists have affirmed, the marine and oceanic character of the country.

Most observers will probably be struck with the snake-like appearance of the skeleton. It differs, however, most essentially, from any existing or fossil serpent, although it may countenance the popular, (and I believe well founded,) impression of the existence in our modern seas, of huge animals to which the name of sea serpent has been attached. For a full and satisfactory statement of the evidence on this subject, see a communication by Dr. Bigelow, of Boston, in the 2d volume of the American Journal.

Dr. Albert C. Koch, a corresponding member of the Societies of Halle, and of Dresden, is the enthusiastic geologist who has made these osteological discoveries, by which the world has been so much amazed. Perhaps the importance of these discoveries cannot be better set forth than in the language of a contemporary, who has thus gazetted his observations. All who have read with interest that delightful Geological romance, "Vestiges of the Natural History of Creation," should not fail to visit Dr. Koch at the Apollo. The reader may remember a passage in "the Vestiges" describing the antediluvian landscape prior to the Coal Formation, when the dull and leaden atmosphere was so heavily charged with carbon that no warm-blooded animal could breath it. When the ferns of the height of a tall pine flung their fan-like branches with unwholesome luxuriance over the stagnant pool that blackened in their shade; when huge lizards of cable-length uncoiled their sluggish forms from the slime of which they seemed to form a part, and stretched their monstrous lengths along the oozy banks that as yet no sunbeams baked, no volcanic fires hardened into rock.

Now, Dr. Koch upsets all this melo-dramatic science in the simplest manner possible, by exhibiting a piece of rock older than "the coal formation," with the track of a bear's foot, and other warm blooded animals imprinted upon it by the worthy witnesses themselves; who, probably, never dreamed that their "footsteps" were hereafter to startle some geologists, like those which Robinson Crusoe saw in the sand; and cheer others, like those from which Longfellow tells us, we

"Seeing, may take heart again."

But, the Doctor has that in his collection which raises new questions, and disturbs old theories, in a still more important degree. It is nothing more nor less that a simple, rude arrow head, not differing in any respect from those which are continually turned up by the plough, all over the country. *But* that arrow head! It knocks into a cocked hat the learning and philosophy of centuries—for it was found below the strata of antidetuvian plants and shells, and *underneath the thigh bone of the gigantic fossilized Missourium,* which Dr. Koch exhumed in the valley of the Mississippi! The bow which shot that arrow must have been bent by some "hunter of Kentucky," long before Noah entered the ark; and the "Native American" who was on a still hunt after that Missourium, instead of being a Tarter from the north of Asia, or a descendant of the lost tribes of Israel, must have been a true Alleghanian son of the soil, of a breed somewhat older than Nimrod.

But the fossil snake! "The great serpent of the Apollo," this is undoubtedly the grandest osteological exhibition that has ever been submitted to public curiosity; for we believe no Saurian has as yet gone beyond seventy-five feet, and this grandfather of the sea serpents would reach at least to one hundred and thirty, if the cartilage were restored to the articulations of his vertibræ. We make him of kin to the sea serpent because his "flippers," like those of a seal, seem to mark him as a marine animal, though Dr. Koch, while exhibiting his great carnivorous teeth (daggers of ivory) imbedded in the blocks of limestone, evidently inclined to the belief that he preyed upon the land while having his haunts along the banks of rivers. Three buffaloes at a meal must have been about a fair allowance for this capacious feeder, who plumply realizes in bulk the portrait which history has drawn of the Great African Snake which stopped the march of the army of Regulus, and yielded at last only to the ponderous rock hurled at him from the Catapult. Livy, we know, is thought by many to have been romancing in this snake story; but, unless Gen Taylor has by this time received his great guns, a serpent like the Hydrarchos between him and the Rio Bravo might reenact the feats of Livy's snake with our arms of occupation.

The indefatigable Dr. Koch (who will soon transfer this wonderful skeleton, as he did his Missourium, to the museums of Europe) is now fairly in advance of all other discoverers of antediluvian remains; unless, indeed, the Mylodon or Mammoth Sloth of South America be placed beyond the Hydrarchos (Hydrarchon ?) But there is still something to be done in this field of inquiry which will place the successful explorer upon a pinnacle of osteological renown where none can rival him. Near the forks of the Kentucky, near "the enchanted mountains" in Tennessee, and in the neighborhood of the little village of Parisburg, in Western Virginia, there is a prevailing tradition—nay a strong living belief among many intelligent persons, that gigantic fossil human skeletons are from time to time disclosed to view by the washing of the mountain streams. The writer of this paragraph has heard more than one person asseverate on the spot that he had seen and handled these remains; persons, who, when told that these must be the bones of other animals than men, insisted that "they had measured the skull, which they knew to be human as well as any doctor in the land, for they had split them to pieces to fit them like caps on their own heads, and try the jaw bones over their own.

When Dr. Koch was lured by the traditions of the country to seek for the remains of the Hydrarchos among the limestone hills of Alabama, his exploration was thought by many to be utterly visionary. They, whose sneers at his credulity are now lost in wonderment at his success, would renew their cavils should he respond to this call to a still more doubtful field of research. But this we know would not deter him from looking after these Alleghanian giants if again induced to visit this country, after he has deposited his Hydrarchos safely in Hamburg.

THE END

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HYDRARCHOS,

A GIGANTIC

FOSSIL REPTILE

OF ALABAMA.

114 Feet in Length,

7500 lbs. Weight.

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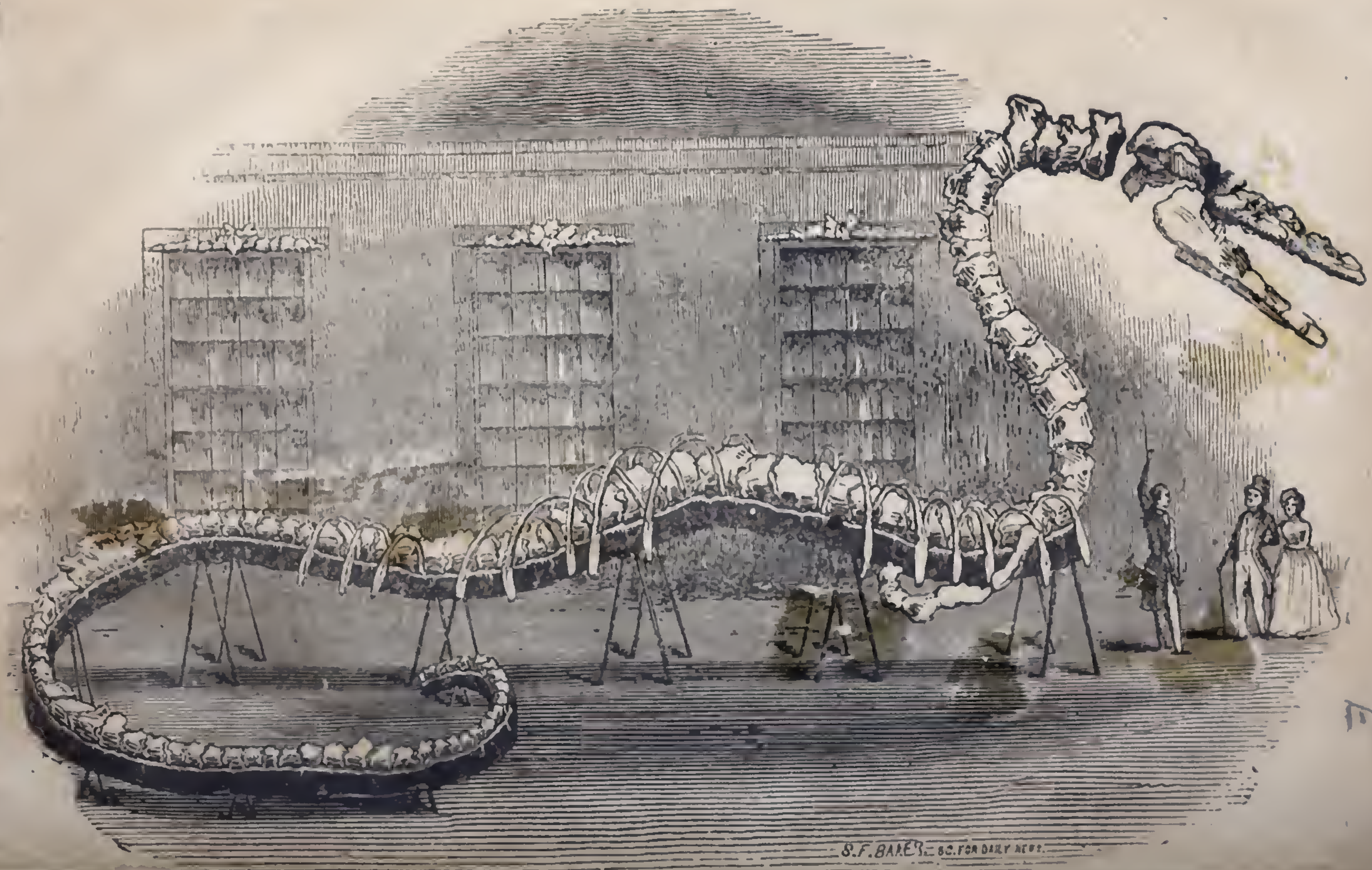
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